Amendments to the Claims:

This listing of claims will replace all prior versions, and listings, of claims in the application:

Listing of the Claims:

Claim 1 (currently amended): A catalytic DNA molecule having site-specific endonuclease activity specific for a nucleotide sequence defining a cleavage site in a preselected substrate nucleic acid sequence,

said molecule comprising first and second substrate binding regions flanking a core region,
said molecule comprising the formula:

5' (X-R)-GGCTAGCHACAACGA ~~(residues 2-16 of SEQ ID NO:122)~~-(X) 3', wherein the sequence GGCTAGCHACAACGA represents residues 2-16 of SEQ ID NO:122,

wherein

each X is any nucleotide sequence,
(X-R) represents said first substrate binding region,
(X) represents said second substrate binding region,
R is a nucleotide capable of forming a base pair with a pyrimidine in said preselected substrate nucleic acid sequence,
H is T, C, or A,
said first substrate binding region comprises a sequence capable of binding through complementary base-pairing to a first portion of said preselected substrate nucleic acid sequence, and
said second substrate binding region comprises a sequence

capable of binding through complementary base-pairing to a second portion of said preselected substrate nucleic acid sequence.

Claim 2 (canceled)

Claim 3 (previously presented): The molecule of claim 1 wherein said formula comprises residues 2-16 of SEQ ID NO 121.

Claim 4 (original): The molecule of claim 1 wherein said first or second substrate binding region is from 5 to 13 nucleotides in length.

Claim 5 (original): The catalytic DNA molecule of claim 1 wherein said catalytic DNA molecule comprises deoxyribonucleotides (DNA), modified DNA, nucleotide analogs, or composites thereof.

Claim 6 (original): The catalytic DNA molecule of claim 1 wherein said substrate nucleic acid comprises RNA, DNA, modified RNA, modified DNA, nucleotide analogs, or composites thereof.

Claim 7 (previously presented): The catalytic DNA molecule of claim 1 wherein said catalytic DNA molecule comprises a single-stranded deoxyribonucleic acid comprising 5' and 3' termini, wherein said termini are modified with exonuclease-resistant nucleotides.

Claim 8 (original): The catalytic DNA molecule of claim 7 wherein said exonuclease-resistant nucleotides comprise nucleoside phosphorothioate.

Claim 9 (original): The catalytic DNA molecule of claim 1 wherein said first or second substrate binding region comprises at least two phosphorothioate nucleosides.

Claim 10 (previously presented): The catalytic DNA molecule of claim 1 wherein said core region comprises a phosphorothioate nucleoside residue in a dipyrimidine within said core.

Claim 11 (previously presented): The catalytic DNA molecule of claim 7 wherein said 3' terminus comprises an inverted (3',3'-linked) nucleotide.

Claim 12 (original): The catalytic DNA molecule of claim 1 wherein said catalytic DNA molecule comprises a 2' O-methyl ribonucleotide.

Claim 13 (previously presented): The catalytic DNA molecule of claim 1 wherein said first and second substrate binding regions respectively comprise a nucleotide sequence complementary to a first and a second portion of a sequence selected from the group consisting of SEQ ID NOs 102-119.

Claim 14 (original): The catalytic DNA molecule of claim 1 wherein said molecule catalyzes a reaction with a K_m of about 0.05 - 1000 nanomolar.

Claim 15 (original): The catalytic DNA molecule of claim 1 wherein said catalytic DNA molecule binds said substrate with a K_m of less than about 1.0 micromolar.

Claim 16 (original): The catalytic DNA molecule of claim 1 wherein said catalytic DNA molecule binds said substrate with a K_m of about 0.1 nanomolar.

Claim 17 (original): The catalytic DNA molecule of claim 1 wherein said molecule has a catalytic reaction turnover rate (k_{cat}) of about 0.005 - 0.1 min^{-1}.

Claim 18 (original): The catalytic DNA molecule of claim 1 wherein said endonuclease activity is enhanced by the presence of a divalent cation.

Claim 19 (original): The catalytic DNA molecule of claim 18 wherein said divalent cation is selected from the group consisting of Pb^{2+}, Mg^{2+}, Mn^{2+}, Zn^{2+}, and Ca^{2+}.

Claim 20 (original): The catalytic DNA molecule of claim 18 wherein said endonuclease activity is enhanced by the presence of Mg^{2+}.

Claim 21 (original): The catalytic DNA molecule of claim 1 wherein said endonuclease activity is enhanced by the presence of a monovalent cation.

Claim 22 (original): The catalytic DNA molecule of claim 21, wherein said monovalent cation is selected from the group consisting of Na^{+} and K^{+}.

Claim 23 (original): A composition comprising two or more populations of catalytic DNA molecules according to claim 1, wherein each population of catalytic DNA molecules is capable of cleaving a different nucleotide sequence in a substrate.

Claim 24 (original): A composition comprising two or more populations of catalytic DNA molecules according to claim 1, wherein each population of catalytic DNA molecules is capable

of recognizing a different substrate.

Claim 25 (currently amended): A method of cleaving a target nucleic acid molecule comprising one or more RNA nucleotides, in vitro, comprising:

a) admixing a catalytic DNA molecule according to claim 1 with a target nucleic acid molecule comprising a preselected substrate nucleic acid sequence complementary to said first and second substrate binding regions, to form a reaction admixture; and

b) maintaining said admixture under predetermined reaction conditions to allow said catalytic DNA molecule to cleave said target nucleic acid molecule, thereby producing a population of substrate products.

Claim 26 (canceled): The method of claim 25, wherein said substrate comprises RNA.

Claim 27 (original): The method of claim 25, wherein said predetermined reaction conditions include the presence of a monovalent cation, a divalent cation, or both.

Claim 28 (original): The method of claim 25 wherein said admixing comprises introducing said catalytic DNA molecule into a cell containing said target nucleic acid molecule.

Claim 29 (currently amended): A method of engineering a catalytic DNA molecule that cleaves a preselected substrate nucleic acid sequence in a target nucleic acid molecule, comprising the steps of:

a) selecting a substrate nucleic acid sequence of from 10 to 26 nucleotides in length in a target nucleic acid molecule; and

b) synthesizing a deoxyribonucleic acid molecule comprising first and second substrate binding regions flanking a core region,
said molecule comprising the formula:

5' (X-R)-GGCTAGCHACAACGA ~~(residues 2-16 of SEQ ID NO:122)~~-(X) 3', wherein the sequence GGCTAGCHACAACGA represents residues 2-16 of SEQ ID NO:122,

wherein
each X is any nucleotide sequence,
(X-R) represents said first substrate binding region,
(X) represents said second substrate binding region,
R is a nucleotide capable of forming a base pair with a pyrimidine in said target nucleic acid molecule,
H is T, C, or A,
said first substrate binding region comprises a sequence capable of binding through complementary base-pairing to a first portion of said target nucleic acid molecule, and
said second substrate binding region comprises a sequence capable of binding through complementary base-pairing to a second portion of said target nucleic acid molecule.

Claim 30 (canceled)

Claim 31 (previously presented): The method of claim 29 wherein said formula comprises residues 2-16 of SEQ ID NO 121.

Claim 32 (original): The method of claim 29 wherein said first or second substrate binding region is from 5 to 13 nucleotides in length.

Claim 33 (original): The method of claim 29 wherein said

catalytic DNA molecule comprises deoxyribonucleotides (DNA), modified DNA, nucleotide analogs, or composites thereof.

Claim 34 (previously presented): The method of claim 29 wherein said catalytic DNA molecule comprises a single-stranded deoxyribonucleic acid comprising 5' and 3' termini, wherein said termini are modified with exonuclease-resistant nucleotides.

Claim 35 (previously presented): The method of claim 34 wherein said exonuclease-resistant nucleotides comprise nucleoside phosphorothioate.

Claim 36 (original): The method of claim 29 wherein said first or second substrate binding region comprises at least two phosphorothioate nucleosides.

Claim 37 (previously presented): The method of claim 29 wherein said core region comprises a phosphorothioate nucleoside residue in a dipyrimidine within said core.

Claim 38 (previously presented): The method of claim 34 wherein said 3' terminus comprises an inverted (3',3'-linked) nucleotide.

Claim 39 (original): The method of claim 29 wherein said catalytic DNA molecule comprises a 2' O-methyl ribonucleotide.

Claim 40 (previously presented): The method of claim 29 wherein said first and second substrate binding regions respectively comprise a nucleotide sequence complementary to a first and a second portion of a sequence selected from the group consisting of SEQ ID NOs 102-119.

Claim 41 (original): The method of claim 29 wherein said molecule catalyzes a reaction with a K_m of about 0.05 - 1000 nanomolar.

Claim 42 (original): The method of claim 29 wherein said molecule has a catalytic reaction turnover rate (k_{cat}) of about 0.005 - 0.1 min^{-1}.

Claim 43 (previously presented): The method of claim 29 wherein said cleavage is enhanced by the presence of a divalent cation.

Claim 44 (original): The method of claim 43 wherein said divalent cation is selected from the group consisting of Pb^{2+}, Mg^{2+}, Mn^{2+}, Zn^{2+}, and Ca^{2+}.

Claim 45 (previously presented): The method of claim 29 wherein said cleavage is enhanced by the presence of a monovalent cation.

Claim 46 (original): The method of claim 45, wherein said monovalent cation is selected from the group consisting of Na^+ and K^+.

Claim 47 (previously presented): The method of claim 29 wherein said substrate nucleic acid comprises RNA, DNA, modified RNA, modified DNA, nucleotide analogs, or composites thereof.

Claim 48 (previously presented): The method of claim 29 wherein said catalytic DNA molecule binds said substrate with a K_m of less than about 1.0 micromolar.

Claim 49 (previously presented): The method of claim 29 wherein said catalytic DNA molecule binds said substrate with a K_m of about 0.1 nanomolar.

Claim 50 (previously presented): The method of claim 43 wherein said cleavage is enhanced by the presence of Mg^{2+}.

Claim 51 (previously presented): The catalytic DNA molecule of claim 1 wherein ``R'' is A or G.

Claim 52 (previously presented): The catalytic DNA molecule of claim 1 wherein said cleavage site is a 5' A-U 3' site in the substrate.

Claim 53 (previously presented): The catalytic DNA molecule of claim 1 wherein said first or second substrate binding region is 7 or 8 nucleotides in length.

Claim 54 (currently amended): The method of claim 29 wherein ~~wherein~~ ``R'' is A or G.

Claim 55 (previously presented): The method of claim 29 wherein said first or second substrate binding region is 7 or 8 nucleotides in length.

Claim 56 (previously presented): The catalytic DNA molecule of claim 1 wherein said catalytic DNA molecule consists essentially of deoxyribonucleotides (DNA).

Claim 57 (previously presented): The catalytic DNA molecule of claim 1 wherein said catalytic DNA molecule consists essentially of deoxyribonucleotides (DNA), modified DNA, or composites thereof.

Claim 58 (previously presented): The catalytic DNA molecule of claim 1 wherein said catalytic DNA molecule consists essentially of deoxyribonucleotides (DNA), nucleotide analogs, or composites thereof.

Claim 59 (previously presented): The method of claim 29 wherein said catalytic DNA molecule consists essentially of deoxyribonucleotides (DNA).

Claim 60 (previously presented): The method of claim 29 wherein said catalytic DNA molecule consists essentially of deoxyribonucleotides (DNA), modified DNA, or composites thereof.

Claim 61 (previously presented): The method of claim 29 wherein said catalytic DNA molecule consists essentially of deoxyribonucleotides (DNA), nucleotide analogs, or composites thereof.